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TITLE: Decision Analysis for a Sustainable Environment, Economy, and Society: A Participatory Framework for Ecosystem Services-Based Decision-Making.

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There is an increasing understanding that top-down regulatory and technology driven responses are not sufficient to address current and emerging environmental challenges such as climate change, sustainable communities, and environmental justice. The vast majority of environmental decisions are made without consideration of the roles of ecosystem services or the complexity of trade-offs under different management choices. Most decision-makers do not currently have access to useful or usable methods and approaches when they are presented with choices that will have significant ecosystem impacts. Such problems require ways to deeply understand the problem scientifically, economically, and socially, in order to develop sustainable solutions and foster effective environmental decision-making. A successful framework for decision-making depends on a systems-level analysis that can characterize the whole system, be sensitive to the views of all interested parties, and account for the uncertainties associated with proposed solutions in a comprehensive manner. The US EPA's Ecosystem Services Research Program (ESRP) Decision Support Framework (DSF) is a structured decision analysis framework with associated tools for enabling decision-makers to make better informed decisions within an ecosystem services context. The aim of the framework is to provide decision-makers with an understanding of probable effects of their planned decisions on social, economic and ecological systems; thus

promoting more sustainable and systems-oriented solutions. Initial efforts focus on developing a support structure for decision-makers responsible for land and resource use at the local, state, tribal and regional scales, fostering integrated research, and promoting innovative solutions. These efforts include development of an open-source, web-based decision analysis framework called DASEES: Decision Analysis for a Sustainable Environment, Economy and Society. DASEES integrates guidance and decision support tools to implement a five step decision process which uses Bayesian Belief Networks: 1) Understand the Context, 2) Define Objectives, 3) Develop Options, 4) Evaluate Options, and 5) Take Action (implement and monitor). DASEES is a flexible framework that can incorporate data, models, processes, and participant perspectives to develop decision capacity. Within each step, tools that were developed in conjunction with stakeholders contribute to shared learning, evaluation of tradeoffs, and selection of management options that support adaptive management.